

The authors' krypton rays agree tolerably closely with Runge's list, but outnumber his very considerably, as might be expected when prisms were used instead of a grating. The authors think that the krypton used by Runge must have contained some xenon, and that the rays for which he gives the wave-lengths 5419·38, 5292·37 and 4844·58 were really due to xenon, as they are three of the strongest rays emitted by their xenon tubes, and are weak in, and in some cases absent from, the spectra of their krypton tubes.

Appended to the paper are tables showing wave-lengths of xenon and krypton lines to four figures.

### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE University of St. Andrews has received information that a legacy of 4000*l.* has been left to it by the late Miss Malcolm for the establishment of medical bursaries and scholarships.

ACTING on the suggestion made by Mr. Chamberlain, the general purposes committee of the Birmingham City Council has resolved to recommend the Council to make a grant to the Birmingham University of the proceeds of a halfpenny rate. This will provide an annual sum of 5000*l.*

THE Agent General for New South Wales intimates that applications are invited from gentlemen qualified to fill the chair of pathology in the University of Sydney. Particulars may be obtained from the Agent General for New South Wales, 9, Victoria Street, London, S.W.

THE Technical Education Board of the London County Council has directed the higher education subcommittee to inquire and report (a) as to the need and present provision for special training of an advanced kind in connection with the application of science (especially chemistry and electricity) to industry; (b) as to what, if any, developments are needed to secure efficient training in these subjects for senior county scholars and other advanced students who desire to qualify themselves to take leading positions in scientific industries. The Board has arranged to make a grant of 10,000*l.* a year to the University of London, and is thus directly interested in the development of advanced scientific instruction in London.

### SCIENTIFIC SERIAL.

*American Journal of Mathematics*, vol. xxiii. No. 3.—Geometry on the cubic scroll of the second kind, by F. C. Ferry, is the conclusion (34 pp.) of a paper commenced in the last number.—Congruent reductions of bilinear forms, by T. J. I'A. Bromwich, contains an account and a slight extension of a method due to Kronecker (*Gesamm. Werke*, Bd. i. p. 349). This method was employed in the first place for the reduction of two quadratic forms. In the present paper it is applied to four cases of reductions, viz. (1) two symmetric forms (the same as Kronecker's case); (2) a symmetric and an alternate form; (3) two alternate forms; and (4) two Hermite's forms. In cases (1)–(3) the substitutions are congruent, while in (4) they are conjugate imaginaries. Mr. Bromwich gives a list of the principal papers which deal with the problems he has considered in his article. On the imprimitive substitution groups of degree fifteen and the primitive substitution groups of degree eighteen, by E. Norton Martin, was presented, in abstract and in a slightly different form, at the summer meeting of the American Mathematical Society in 1899. Herein he has added two new groups to his original list, viz. the groups with five systems of imprimitivity simply isomorphic to the alternating and symmetric groups of degree five, and he mentions that Dr. Kuhn reported at the February (1900) meeting of the Society that he had carried the investigation further by adding twenty-eight to the seventy groups found by Mr. Martin. The list even now does not claim to be absolutely complete, since omissions are always possible. A somewhat long list of recent papers on the subject is appended to the article.—Removal of any two terms from a binary quantic by linear transformations, by Bessie G. Morrison, discusses these linear transformations and gives applications to the non-singular cubic, quartic, quintic and sextic.

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### SOCIETIES AND ACADEMIES.

LONDON.

**Geological Society**, June 19.—Mr. J. J. H. Teall, V.P.R.S., president, in the chair.—On the use of a geological datum, by Mr. Beeby Thompson. A proper interpretation of geological phenomena frequently requires that allowance shall be made for differential earth-movements that have taken place since the period under consideration. Present differences of level in rocks of the same age may be due to actual differences in depth of the sea-floor on which they were deposited; but they may also be the result of subsequent differential earth-movements. The rock selected as a datum should combine as far as possible the following characteristics:—It should be thin, of considerable horizontal extension, having similarity in physical characters and palæontological contents over a large area, and situated as near as possible, in vertical sequence, to the reference-deposit. In Northamptonshire three formations meet these requirements—the Rhætic Beds, the Marlstone Rock-bed and the Cornbrash. The author applies the Marlstone Rock-bed as a datum to the study of the five chief deep explorations in Northamptonshire, with the following results:—While the old land-surface (below the Trias) now varies in height by more than 250 feet, the variation in thickness of the rocks between it and the Middle Lias only reaches 56½ feet; and although the old land-surface is actually lowest where the Rhætic rocks have not been detected, when compared with the position of the Marlstone it is found to be the highest. The further application of the same method enables the author to recognise Rhætic rocks at Northampton, to correct the record of the Kingsthorpe shaft, and to explain the presence of Triassic saline water in the Marlstone. A revised section of the Kingsthorpe shaft is given. Another point proved is that a general levelling-up process was going on just before the beginning of the Lower Liassic Period, and another at the close of the Middle Liassic Period.—On intrusive, tuff-like, igneous rocks and breccias in Ireland, by Messrs. James R. Kilroe and Alexander McHenry.—Many fragmental igneous rocks, although resembling tuffs, cannot be regarded as ejectamenta on account of their character and mode of occurrence in the field. A series of sections is exhibited to illustrate how tuff-like masses invade black slate of Llandeilo age in the South-east of Ireland, generally adhering to the direction of bedding, but frequently cutting across it and detaching numerous pieces from the slate, which are more abundant near the margins of the intrusion than elsewhere.

PARIS.

**Academy of Sciences**, July 8.—M. Fouqué in the chair.—On new derivatives of benzylcamphor and benzylidenecamphor, by MM. A. Haller and J. Minguin. In continuation of previous researches it is now shown that the unsaturated acid,  $C_6H_5 \cdot CH = CH \cdot C_6H_4 \cdot CO_2H$ , obtained by the action of hydrobromic acid on benzylidenecamphor, or by treating bromobenzylcamphor with alcoholic potash or ammonia, combines with a molecule of hydrogen bromide to form phenylbromohomocampholic acid, which, when warmed with hydrobromic acid in acetic acid solution, loses bromine and yields the corresponding hydroxy-acid. The action of bromine on dextrobenzylcamphor results in the formation of two stereoisomeric bromobenzylcamphors which yield benzylidenecamphor on treatment with alcoholic potash. Further bromination of benzylcamphor gives rise to unstable dibromo-derivatives which are converted by the action of potash into ortho- and para-bromobenzylidenecamphors; the para-compound forms bromophenylhydroxyhomocampholic acid on treatment with hydrobromic acid at 100°.—Osmotic pressure and its rôle as a protection from cold in the living cell, by M. D'Arsonval. At the low temperature of liquid air animal and vegetable tissues in general become extremely hard and friable, whereas the vitality of yeast and various pathogenic micro-organisms is not impaired even by several weeks' exposure to cold. In explanation of this fact it is suggested that the solidification of such minute cells is prevented by the enormous osmotic pressure exerted therein, and it is shown that in the case of yeast the osmotic pressure may be reduced by the action of hypertonic solutions of certain salts to such an extent as to destroy the power of resisting the influence of cold.—New nebulae discovered at the Paris Observatory, by M. G. Bigourdan.—Observations of Hall's comet 1901(a) at the Rio de Janeiro Observatory, by M. H. Morize.—Solar observations at the Lyon Observatory during the first quarter of 1901, by M. J. Guillaume.—On the conjugate nets of orthogonal and

isothermal curves, by M. Demartres.—On the use in series of disjunctive voltmeters, by M. Ch. Pollak. A note on a previous communication by the author.—On manganic phosphates, by M. V. Auger. The phosphate obtained by heating manganese nitrate with phosphoric acid at  $210^{\circ}$  and extracting the fused mass with water has the composition  $\text{MnP}_2\text{O}_7 + 14\text{H}_2\text{O}$ , and is evidently a pyrophosphate; it is dissolved by phosphoric acid, forming a violet solution which soon becomes opalescent and deposits the normal phosphate,  $\text{MnPO}_4 + \text{H}_2\text{O}$ . Manganese metaphosphate,  $\text{MnP}_3\text{O}_{10}$ , is obtained by heating phosphorus pentoxide with hydrated manganese dioxide.—Action of acid chlorides on methanal, by M. Louis Henry. The author confirms Descudé's recent observation that the presence of zinc chloride facilitates the action of acid chlorides on aldehydes. Benzoyl chloride alone has no action on methanal (trioxymethylene), but in the presence of zinc chloride a rapid reaction takes place with the form of a substance, crystallising in needles, which appears to be chloromethyl benzoate.—Action of vegetable alkaloids on some indicators, by M. A. Astruc. The behaviour of a number of alkaloids towards the indicators helianthin, rosolic acid and phenolphthalein was examined. In order to avoid the dissociating influence of water, ethyl alcohol, amyl alcohol and benzene were employed as solvents. The results obtained depend on the solvent used in each case, as well as on the nature of the alkaloid.—On dinaphthoxanthene, by M. R. Fosse. The action of bromine on dinaphthoxanthene leads to the formation of bromodinaphthoxanthene, a red, crystalline substance melting at  $218-220^{\circ}$ , which is remarkable in that when warmed with alcohol it undergoes a reaction similar to that exhibited by diazo-derivatives, hydrogen bromide, aldehyde and dinaphthoxanthene being produced. Bisdinaphthoxantheneamine, obtained by the action of alcoholic ammonia on the above-described bromine derivative, is a crystalline compound melting at  $230^{\circ}$ . Chlorodinaphthoxanthene crystallises in red needles melting at  $150^{\circ}$ .—Study of the product of the nitration of acetoacetic ether, by MM. L. Bouveault and A. Bongert. The compound previously described as produced by the nitration of acetoacetic ether is shown to be isomeric with, but quite different in its reactions from, the substance which Scholl obtained by the action of silver nitrate on ethyl bromacetate.—On a method of synthesis of acetylenic aldehydes, by MM. Ch. Moureu and R. Delange. The condensation of the ethers of formic acid with the sodium derivatives of true acetylenic hydrocarbons,  $\text{R}-\text{C}\equiv\text{CH}$ , leads to the formation of acetylenic aldehydes,  $\text{R}-\text{C}\equiv\text{C}-\text{CHO}$ , whilst the ethers of higher acids give rise to acetylenic ketones.—Attempts to render vegetables immune against cryptogamic diseases, by M. J. Beauverie. Seeds and cuttings grown in soil in which the fungus *Botrytis cinerea* had been previously allowed to develop were found to produce plants capable of resisting the action of the fungus.—On the rôle of leucocytes in elimination, by M. Henry Stassano.—Glucoproteins as new culture media, of definite chemical composition, for the study of microbes, by M. Charles Lepierre. Nearly all microbes, whether pathogenic or not, grow perfectly in liquids in which the nitrogen is furnished exclusively by glucoproteins.—The structure and function of the nervous system of an acephaloid, by MM. N. Vashide and C. Vurpas.—Acoustic conductivity and audition, by M. Pierre Bonnier.—On the intermittent spring at Vesse, near Vichy, by M. F. Parmentier. The action of this spring lasts for a period of an hour and takes place three times in 25-27 hours. The water is thrown to a height of 7-8 metres and is accompanied by a copious evolution of carbon dioxide; it has a temperature of  $31^{\circ}$ , and yields a solid residue of 5.354 grams per litre consisting chiefly of sodium carbonate.

#### NEW SOUTH WALES.

**Royal Society**, May 1.—Prof. Liversidge, president, in the chair.—Mr. H. C. Russell, C.M.G., F.R.S., was elected president for the current year.—Prof. Liversidge delivered an address, in the course of which he referred to the Intercolonial Catalogue of Scientific Literature. This work, he said, would annually fill seventeen volumes, and would contain from 160,000 to 200,000 entries yearly, and would prove an inestimable boon, as it would relieve scientific people from much of the trouble now attendant upon hunting up references to scientific subjects. He trusted that some effort would be made to collect and forward material from Australia for inclusion in this catalogue. He was also strongly in favour of a federation of the leading scientific societies in Australia and the establishment of a national Australian academy, and suggested that a site for such

an academy, museums, art galleries, and a Federal University and other scientific and educational societies might be reserved in the capital of the Commonwealth. The organisation proposed would somewhat resemble the Continental academies so far as its scope was concerned, but under rules more like those of the Royal Society of London. If the proposal were carried out it would be of great benefit to Australia, not only in its general usefulness, but in the stimulus it would give to the younger scientific men, since election to it would depend upon fitness and merit. It would be very gratifying to all who were interested in the matter if, with the new century and the inauguration of the Commonwealth, there was increased attention paid to the question of instruction in science in the schools and better provision made in this direction, for it would be of great usefulness in training the power of observation of the children and teaching them to think about what they saw and heard. Some of the teaching now done at the University should be given in the schools, and the student would then gain valuable time at the University for things he could not do at school. He did not advocate the teaching of technical or applied sciences in ordinary schools. It was to be regretted that the Sydney University was probably the only modern University that excluded science from its entrance examinations. Prof. Liversidge also made some observations in connection with the advantages of a metric system of weights and measures and a decimal system of coinage. He strongly recommended that its teaching should be compulsory in all the schools of the State. The chief defect of our present system of weights and measures was that there was no simple connection between measures of length, weight and capacity. Investigation showed that in countries where the change to the metric system had been made, no great difficulty was experienced, and an increase of trade had resulted. He strongly urged that increased attention should be paid to commercial education and suggested that, not only should it include a certain amount of instruction in science, but that the standard for the higher branches should be as high as for any of the learned professions, also that part of the course should be given at the University.

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